



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/563,175	08/09/2006	Wolfgang Singer	21483-014US1	3763
26161	7590	03/16/2010		
FISH & RICHARDSON PC P.O. BOX 1022 MINNEAPOLIS, MN 55440-1022			EXAMINER KIM, PETER B	
			ART UNIT 2882	PAPER NUMBER
			NOTIFICATION DATE 03/16/2010	DELIVERY MODE ELECTRONIC

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

PATDOCTC@fr.com

# Office Action Summary

## Application No.

10/563,175

## Applicant(s)

SINGER ET AL.

## Examiner

Peter B. Kim

## Art Unit

2882

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 25 February 2010.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-42 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-42 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SE/US)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

### DETAILED ACTION

In response to applicant's arguments filed on Feb. 25, 2010, the finality of the previous office action is withdrawn, and the rejection is modified as follows.

#### *Claim Rejections - 35 USC § 103*

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-6, 8, 10-17, 21, 23-30, 34-37, 41, and 42 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sato (2002/0154284) in view of Komatsuda (6,452,661) and Nishi (2003/0128348).

Regarding claims 1, 11, 12, 27-29, 30, 35-37, and 42, Sato discloses an illumination system for lithography and a projection exposure system and a method for producing micro-structured component using the projection system (Fig. 1) for illuminating a field in a field plane (9, reticle plane), a field plane which has an extension in a scanning direction and an illumination intensity perpendicular to the scanning direction (para 0066), with at least one optical integrator (5) which splits a light bundle emitted by a light source (1) into a plurality of light channels each having a light intensity (para 0045), and a filter (51) in the light path from the light source to the field plane, with the filter having filter elements (51a, Fig. 2C) which are configured to reduce intensity of at least one light channel (para 0049) to achieve substantially homogeneous illumination of the field in the field plane (para 0049). Sato discloses at least one optical component (6) arranged in the light path from a light source (1) to the field plane (9) to be

illuminated between the optical integrator and the field plane wherein the component is corrected in an aplanatic way (para 0004, 0047, meets the sine condition, distortion aberration is kept sufficiently small and imbalance in size (numerical aperture) of the secondary light sources is removed) such that the sigma variation is less than 10% (para 0047), and the plurality of filter elements are arranged in such a way so that the uniformity error are less than  $\pm 3\%$  (para 0011) and a projection objective (10) for projecting an object arranged in the field plane into an image in the image plane (11). Regarding claims and 4 and 5, Sato discloses the filter arrangement as claimed in Fig. 3A and para 0050. However, Sato does not disclose an EUV illumination system or wavelength in the region between 11 and 14 nm and an optical integrator which is a reflective honeycomb condenser. Komatsuda discloses an illumination system for EUV lithography or wavelength between 11 and 14 nm (col. 5, lines 35-45) comprising an optical integrator of a reflective honeycomb condenser (56, 60). Nishi (2003/0128348) discloses a system comprising an excimer laser beam, condenser lens (18R), relay lens (18K), a filter (18A) for light-reducing and other lenses in Fig. 2 and para 0247 and 0248. Nishi also discloses that one of ordinary skill would be able to modify such system to accommodate an EUV system in para 0459, which means the excimer laser system which includes refractive lenses would be modified to an EUV system comprising reflective elements.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to provide the EUV illumination source to the invention of Sato in order to improve resolution by decreasing the wavelength since as shown by Nishi that modifying an excimer laser system to accommodate an EUV system requires only routine skill in the art.

Regarding claim 2, Sato discloses wherein a reduction of the light intensity of the at least one light channel after the filter element is within 0 and 100% of the light intensity (para 0049). Regarding claims 6, 8, 21, 23 and 24, Sato discloses the filter element comprising a transmission filter element of variable neutral grey filter associated with the light channel (Fig. 3A-3D, para 0050). Regarding claims 10, 34 and 41, Sato discloses the filter element comprising a diaphragm associated with the light channel (circular filter regions 51a, 51b, Fig. 3A). Regarding claims 15 and 16, Sato discloses a separate filter element arranged in front of the optical integrator (Fig 1). Regarding claim 25, Sato discloses a changeable filter element (para 0050, Fig. 3B and 3C). Regarding claims 13 and 14, Sato discloses a ring field with a radial and azimuthal extension (para 0066).

Regarding claim 3, although Sato does not disclose the reduction in intensity within the percentage claimed, it would have been obvious to one of ordinary skill in the art to provide the filter element which reduces the light intensity within 25 and 80%, since it has been held that where the general condition of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art.

Regarding claim 17, although Sato does not disclose the filter arranged in the plane after and close to the optical integrator, it would have been obvious to one of ordinary skill in the art to provide the filter after the optical integrator instead of before since it has been held that rearranging parts of an invention involves only routine skill in the art.

Claims 7, 9, 22, 33 and 40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sato in view of Komatsuda as applied to claim 1 above, and further in view of Kondo (2004/0032576).

The further difference between the claimed invention and the modified Sato is the reflective optical component of the filter which is adjusted to the reduction. Kondo discloses in para 0133 that with EUV illumination a filter of a reflection type is used. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to provide a reflective filter which has been adjusted to provide the required reduction to the invention of Sato since with EUV illumination less transmission is necessary as taught by Kondo in para 0133.

Claims 18-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sato in view of Kamatsuda as applied to claim 1 above, and further in view of Schultz et al. (Schultz) (6,438,199).

The further difference between the modified Sato and the claimed invention is the first and second raster elements and the filter arranged between the first and second raster elements. Schultz discloses the optical integrator comprising a first and second optical elements with a plurality of first raster elements (5) and a plurality of second raster elements (9). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to provide such optical integrator to the invention of Sato in order to minimize the deflection angles and to redistribute the intensity distribution as taught by Schultz in col. 6, lines 3-6, and to arrange the

filter elements between the first and second optical elements with a first and second raster elements since it has been held that rearranging parts in an invention requires only routine skill.

Claims 31, 32, 38 and 39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sato in view of Komatsuda as applied to claims 30 and 37 above, and further in view of Banine (2004/0257546).

The further difference between the claimed invention and the modified Sato is the reflected faceted optical element and a second reflective faceted optical element each comprising first and second raster elements. Banine discloses a first faceted optical element with first raster elements (209) and a second faceted optical element with second raster elements (215). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to provide the first and second faceted elements of Banine to the invention of Sato in order to provide an optical integrator which create secondary sources as taught by Banine in para 0043.

### ***Response to Arguments***

Applicant argues that Sato's system is not compatible with an EUV light source since Sato discloses a condenser lens, a collimator lens or a zoom lens. However, as indicated in the rejection above, Nishi teaches that an arrangement including an excimer laser, lenses and a filter element can be modified to accommodate an EUV illumination by providing a reflective system. Applicant argues that the reflection system of Nishi would not include the optical element 4 and 6 of Sato which are condenser lenses. The examiner agrees that the element 4 and 6 of Sato

would not be included in a system with an EUV illumination, but a reflective element would be used. As a further evidence that applying a system using an excimer laser to a system using an EUV illumination would only require a routine skill in the art, Kondo (2004/0032576) is cited. Kondo discloses in Fig. 2 and para 0052 an illumination system comprising an excimer laser source (para 0044), a relay lens (6) and a condenser lens (8), and a filter (55) which reduces the light intensity in the light path after the filter element. Kondo also discloses in para 0133 that the such invention can also be modified to accommodate EUV light source by using reflective elements.

Further it would be obvious to improve the invention of Sato with the EUV illumination to improve the resolution since it has been held that the use of known technique to improve a similar devices in the same way would yield predictable result in view of the teaching by Nishi and further evidenced by Knodo.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Peter B. Kim whose telephone number is (571) 272-2120. The examiner can normally be reached on 9:00 AM - 5:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ed Glick can be reached on (571) 272-2490. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.



Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Peter B. Kim/  
Primary Examiner, Art Unit 2882

March 10, 2010